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THE INFLUENCE OF BORON ADDITION ON STRUCTURAL, MAGNETIC AND THERMOELECTRIC PROPERTIES OF $Ni_2Mn_{1.52}Sb_{0.48}B_x$

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ABSTRACT

Heusler alloys known as X_2YZ (full-Heusler) and XYZ (half-Hersler), where X and Y denote the transition metals and X is *s*-*p* such as Al, Ga, Sb, Sn, In, ect., have been extensively studied since they possess many important properties [1-3] like shape memory effect, magnetocaloric effect (MCE), magnetoresistance and thermoelectric effect. In this work, structure, magnetic and thermoelectric properties of the full-Hersler $Ni_2Mn_{1.52}Sb_{0.48}$ alloy were investigated in terms of Boron (B) addition. We have found that the structural transition temperature i.e. the ferromagnetic-to-antiferromagnetic martensitic transition (T_M) decreases, while the paramagnetic-ferromagnetic austenitic transition (T_C) tends to increase with increasing B concentration. Temperature dependent X-ray diffraction patterns from 200 - 500 K clearly shows an evolution of the structural transformation from orthorhombic to cubic structure. It was interestingly found in the high-temperature (300 - 1000 K) thermoelectric properties, that the sample with x = 1 switches from *n*-type conducting behavior at temperatures below 570 K to *p*-type conducting one in higher temperature region. However, with higher B concentration e.g. x = 2, the sample shows *n*-type conducting behavior over the whole measured temperature range, again confirming the effect of boron addition.

References:

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